

## City and Guilds of London Institute

1959

## 55.—RADIO AMATEURS' EXAMINATION

Friday, May 8th, 6.30 to 9.30 p.m.

*Eight questions in all are to be attempted, as under :**Both questions in Part 1 (which are compulsory) and six others from Part 2.**Failure in either part will carry with it failure in the examination as a whole.***Part 1***Both questions must be attempted in this part.*

1. List four of the frequency bands available to amateurs showing in each case, (a) the width of the band, (b) the class or classes of emission permitted, and (c) the maximum d.c. input power to the final amplifier permitted. How is the d.c. input power to the final amplifier measured? (15 marks)

2. What precautions should be taken, in designing an H.F. transmitter suitable for use in an amateur station, to ensure that the frequency of the radiated wave remains satisfactorily stable? What form of frequency-measuring equipment would be required to ensure that a variable-frequency oscillator-controlled transmitter at an amateur station is operating with emissions within the authorised frequency bands? (15 marks)

**Part 2***Six questions only to be attempted in this part.*

3. A coil having 1.59 millihenrys inductance and 10 ohms resistance is connected in turn to the following sources of e.m.f. :—

- (a) 12 volts d.c.  
 (b) 12 volts 1 Mc/s a.c.

What current flows through the coil in each case? Explain why the current differs in each case. (10 marks)

[SEE OVER]

4. Describe the structure of a low-power thermionic valve of the indirectly-heated triode type. Explain how the anode volts/anode current characteristic is measured and plotted. (10 marks)

5. Describe two methods by which receivers can be made to receive either radiotelephony or c.w. telegraphy at will. What are the advantages and disadvantages of each method? (10 marks)

6. Draw a circuit diagram of a crystal oscillator and explain its action. (10 marks)

7. In order to maintain 24-hour contact between two stations 3000 miles apart more than one frequency of transmission is usually required. Why is this? Describe the paths which might be followed by the radio waves between the two stations. (10 marks)

8. Describe with diagrams a method of coupling a transmitter to an aerial when transmitting on a frequency in the H.F. range so that the radiation of harmonics of the fundamental frequency is reduced to a minimum. (10 marks)

9. Describe the construction of a moving coil loudspeaker. Why is a field magnet necessary? (10 marks)

10. Draw a circuit diagram of the R.F. amplifier stage of a receiver. If the tuning capacitor has a maximum value of 100 micro-microfarads and a minimum value of 40 micromicrofarads, what frequency range would it cover if the tuning coil had a value of inductance of 63.5 microhenrys? (10 marks)